Process, Assessment, Outcome (PAO) Workshop Application

The Montana Office of Public Instruction's (OPI) Assessment Division, is bringing together a group of science educators to review high-quality aligned assessment items and identify cohesive item sets and instructional strategies to meet the Montana Science Standards. Montana adopted new science standards in September of 2016 and they align with the Next Generation Science Standards (NGSS). As teachers make the transition to instruction aligned to NGSS, formative assessment will be an essential tool to ensure that instruction meets student need.

Through using assessments in this formative way teachers will have instruction that is guided by, and responsive to, information they have about their students. The product(s) of this workshop will be to provide elementary and secondary educators with access to high-quality items, item sets, and instructional strategies teachers can use to dig deeper into the standards.

Deadline extended: This form closes on Monday, April 24th at 9:00 am.

1. Name (First and Last Name):
2. Preferred Email:
3. Phone:
4. Present or most recent employer: For example: school name, organization, etc.
5. School City: If you are not currently teaching, indicate the city you live in.
6. Present or most recent teaching assignment: For example: I taught high school biology in a rural class A school.
7. Please tell us your highest degree attained, any endorsements you have, and the core concentration of your education.

8. Do you have any specialized training or expertise? (e.g., IEFA, LEP, ESL, SWD, etc.)

9. Please indicate the subjects you have taught and how many years of experience you have in each.

	Years 0 - 1	Years 1.1 - 5	Years 5.1 - 10	Years 10.1-15	Years 15 +	Pre-service training only.	None.
Elementary science	○	○	○	○	○	○	○
Astronomy	○	○	○	○	○	○	○
Biology	○	○	○	○	○	○	○
Chemistry	○	○	○	○	○	○	○
Computer science	○	○	○	○	○	○	○
General Biology	○	○	○	○	○	○	○
Earth Science	○	○	○	○	○	○	○
Engineering	○	○	○	○	○	○	○
Geology	○	○	○	○	○	○	○
Physics	○	○	○	○	○	○	○
Other Biological Science	○	○	○	○	○	○	○
Other Physical Science	○	○	○	○	○	○	○
Other Earth Science	○	○	○	○	○	○	○

10. Please indicate the grades you have taught and how many years of experience you have in each.

	Years 0 - 1	Years 1.1 - 5	Years 5.1 - 10	Years 10.1-15	Years 15 +	Pre-service training only.	None.
Early childhood	○	○	○	○	○	○	○
Kindergarten	○	○	○	○	○	○	○
Grade 1	○	○	○	○	○	○	○
Grade 2	○	○	○	○	○	○	○
Grade 3	○	○	○	○	○	○	○
Grade 4	○	○	○	○	○	○	○
Grade 5	○	○	○	○	○	○	○
Grades 6 - 8	○	○	○	○	○	○	○
Grades 9-10	○	○	○	○	○	○	○
Grades 11- 12	○	○	○	○	○	○	○
Undergraduate level	○	○	○	○	○	○	○
Graduate level	○	○	○	○	○	○	○

11. What activities, professional development, and/or trainings have you participated in that involve the Next Generation Science Standards (NGSS), the Framework for K – 12 Science Education, and/or Montana Science Standards (2016).

12. Select your degree of comfort with using and/or navigating Next Generation Science Standards (NGSS), the Framework for K – 12 Science Education, and/or Montana Science Standards (2016):

☐	☐	☐	☐	☐
1- Novice – very comfortable.	2	3	4	5-Highly familiar – very comfortable.

13. Please rate yourself in the following areas by checking the appropriate level for each skill:

	3 = Strong Skills. Extensive experience in this area.	2 = Moderate Skills. Some experience in this area.	1 = Novice. Limited experience in this area.
Collaboration: Working with Others	○	○	○
Critical thinking and Problem-Solving	○	○	○
Adaptability	○	○	○
Accessing and Analyzing Information	○	○	○
Initiative and Perseverance	○	○	○
Facilitation Skills	○	○	○
Communication Skills (Verbal and Written)	○	○	○

14. For this workshop, what area are you interested in evaluating?

- ☐ Elementary Science (K-2)
- ☐ Elementary Science (3-5)
- ☐ MS-Life Science
- ☐ MS-Earth and Space Science
- ☐ MS-Physical Science
- ☐ HS-Life Science
- ☐ HS-Earth and Space Science
- ☐ HS-Physical Science

15. If selected for this workshop, select your future interests in Montana Science Standard work:

- ☐ I'm interested in being a teacher leader (e.g., school, district, and statewide).
- ☐ I'm interested in developing online content for the Teacher Learning Hub.
- ☐ I'm interested in developing items for Montana's statewide summative science assessment.
- ☐ I'm interested in reviewing items for Montana's statewide summative science assessment.
- ☐ I'm interested in submitting my own assessments (formative and interim) for statewide use.
- ☐ I'm interested in being involved in anything related to science at the state.
- ☐ I'm not interested in any other activities at this time.

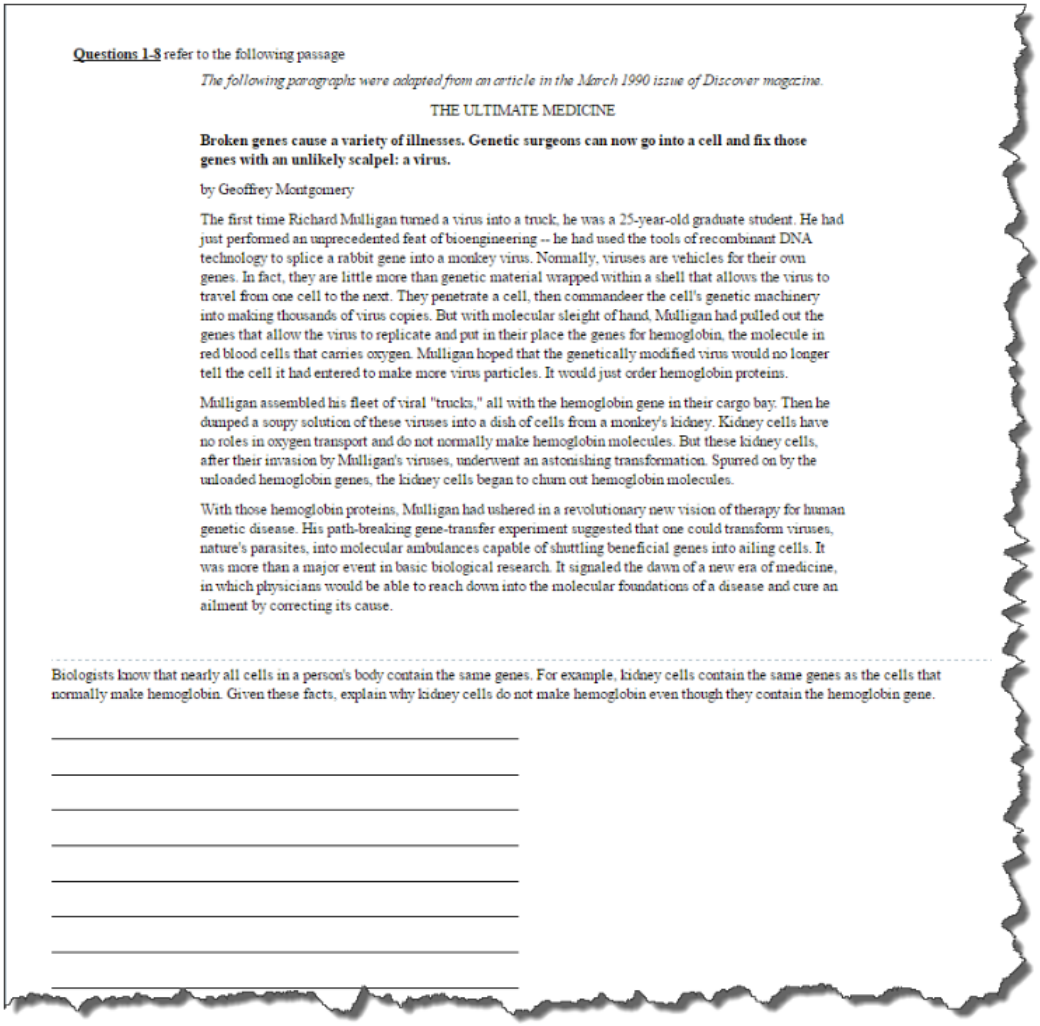
16. If selected, please describe how your participation in this work will continue to serve your career interests and professional growth.
17. If selected, what are some ways (after the workshop) you plan to use this experience in your practice and/or share this experience with others.

Deconstruct - Align - Apply

For Questions 1 – 15, please use A Framework for K – 12 Science Education or http://nextgenscience.org. You may download a free PDF of the A Framework for K – 12 Science Education at https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts.

The below item may be outside your expertise but use the supports provided to deconstruct the item. Selected participants will be matched with their content area and expertise. For more information about the item, please visit: http://nces.ed.gov/nationsreportcard/itmrlsx/portal.aspx?type=display&questionlist=2000-12S15:4&index=1&tab=ques

Using your knowledge about the item, please answer the following questions.



Questions 1-8 refer to the following passage

The following paragraphs were adapted from an article in the March 1990 issue of Discover magazine.

THE ULTIMATE MEDICINE

Broken genes cause a variety of illnesses. Genetic surgeons can now go into a cell and fix those genes with an unlikely scalpel: a virus.

by Geoffrey Montgomery

The first time Richard Mulligan turned a virus into a truck, he was a 25-year-old graduate student. He had just performed an unprecedented feat of bioengineering -- he had used the tools of recombinant DNA technology to splice a rabbit gene into a monkey virus. Normally, viruses are vehicles for their own genes. In fact, they are little more than genetic material wrapped within a shell that allows the virus to travel from one cell to the next. They penetrate a cell, then commandeer the cell's genetic machinery into making thousands of virus copies. But with molecular sleight of hand, Mulligan had pulled out the genes that allow the virus to replicate and put in their place the genes for hemoglobin, the molecule in red blood cells that carries oxygen. Mulligan hoped that the genetically modified virus would no longer tell the cell it had entered to make more virus particles. It would just order hemoglobin proteins.

Mulligan assembled his fleet of viral "trucks," all with the hemoglobin gene in their cargo bay. Then he dumped a soupy solution of these viruses into a dish of cells from a monkey's kidney. Kidney cells have no roles in oxygen transport and do not normally make hemoglobin molecules. But these kidney cells, after their invasion by Mulligan's viruses, underwent an astonishing transformation. Spurred on by the unloaded hemoglobin genes, the kidney cells began to churn out hemoglobin molecules.

With those hemoglobin proteins, Mulligan had ushered in a revolutionary new vision of therapy for human genetic disease. His path-breaking gene-transfer experiment suggested that one could transform viruses, nature's parasites, into molecular ambulances capable of shuttling beneficial genes into ailing cells. It was more than a major event in basic biological research. It signaled the dawn of a new era of medicine, in which physicians would be able to reach down into the molecular foundations of a disease and cure an ailment by correcting its cause.

Biologists know that nearly all cells in a person's body contain the same genes. For example, kidney cells contain the same genes as the cells that normally make hemoglobin. Given these facts, explain why kidney cells do not make hemoglobin even though they contain the hemoglobin gene.

1. What grade-band is most applicable to this item? Please select the best option.

- ☐ Grades K-2
- ☐ Grades 3-5
- ☐ Grades MS (i.e., 6-8)
- ☐ Grades HS (i.e., 9-12)

2. Identify the Disciplinary Core Ideas students must understand. Select all relevant concepts. (Description of Disciplinary Core Ideas on Framework pages 103 – 214). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20E%20-%20Progressions%20within%20NGSS%20-%20052213.pdf

- ☐ PS1: Matter and its interactions
- ☐ PS2: Motion and stability: Forces and interactions
- ☐ PS3: Energy
- ☐ PS4: Waves and their applications in technologies for information transfer
- ☐ LS1: From molecules to organisms: Structures and processes
- ☐ LS2: Ecosystems: Interactions, energy, and dynamics
- ☐ LS3: Heredity: Inheritance and variation of traits
- ☐ LS4: Biological evolution: Unity and diversity
- ☐ ESS1: Earth's place in the universe
- ☐ ESS2: Earth's systems
- ☐ ESS3: Earth and human activity
- ☐ ETS1: Engineering design
- ☐ ETS2: Links among engineering, technology, science, and society

3. Identify the Crosscutting Concepts students must understand. Select all relevant concepts. (Description of Crosscutting Concepts on Framework page 84). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf

- ☐ Patterns
- ☐ Cause and effect: Mechanism and explanation
- ☐ Scale, proportion, and quantity
- ☐ Systems and system models
- ☐ Energy and matter: Flows, cycles, and conservation
- ☐ Structure and function
- ☐ Stability and change

4. Identify the Science and Engineering Practices students must use. Select all relevant practices. (Description of Practices on Framework pages 50 – 53). NGSS at: http://nextgenscience.org/sites/default/files/resource/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf

- ☐ Asking questions (for science) and defining problems (for engineering)
- ☐ Developing and using models
- ☐ Planning and carrying out investigations
- ☐ Analyzing and interpreting data
- ☐ Using mathematics and computational thinking
- ☐ Constructing explanations (for science) and designing solutions (for engineering)
- ☐ Engaging in argument from evidence
- ☐ Obtaining, evaluating, and communicating information

5. Identify the corresponding Montana Performance Standard for this item.
(e.g., NGSS Performance Expectation, K-2-ETS1).

6. What is the focus or skills being emphasized by this item? Identify an NGSS Evidence Statement from http://nextgenscience.org/evidence-statements that provides observable features of student knowledge and skill(s). Provide one claim statement for this item below:

7. Select the degree of alignment to the Montana Performance Standard. How well does this item "fit" the Montana Performance Standard? Please select the best option.

- ☐ **Full alignment.** This question clearly belongs in this standard.
- ☐ **Strong partial alignment.** This item may belong in this standard; however, there is one or more aspects of the item that does not fit well.
- ☐ **Weak partial alignment.** There is some overlap with the standard but it is a stretch and we cannot find a better standard.
- ☐ **No alignment.**

8. Must your 3-Dimensional selection match exactly the Montana Performance Standard/NGSS performance expectation in order to be aligned? Explain your thinking about item alignment.

9. Cognitive Rigor. What is the Depth of Knowledge (DOK) for this item? Please select the best option. Resource at: https://drive.google.com/file/d/0B34l3UA3OHHnLU80UWhNLW83YWM/view?usp=sharing

- ☐ Level 1-Recall
- ☐ Level 2- Skills & Concepts/ Basic Reasoning
- ☐ Level 3- Strategic Thinking/ Complex Reasoning
- ☐ Level 4- Extended Thinking

10. Cognitive Rigor. What is the Bloom's Taxonomy for this item? Please select the best option. Resource at: https://drive.google.com/file/d/0B34l3UA3OHHnLU80UWhNLW83YWM/view?usp=sharing

- ☐ Remember (Level 1)
- ☐ Understand (Level 2)
- ☐ Apply (Level 3)
- ☐ Analyze (Level 4)
- ☐ Evaluate (Level 5)
- ☐ Create (Level 6)

11. Explain if there is any connection to Montana's Math Standards and/or the math practices. If a connection exists, identify what content and/or skills are being reinforced. Math practice resource located at: http://nstahosted.org/pdfs/ngss/PracticesVennDiagram.pdf
(e.g., the mathematical practice "reason abstractly and quantitatively", etc.).

12. Explain if there is any connection to Montana's English Language Arts Standards and/or the ELA student capacities. If a connection exists, identify what content and/or skills are being reinforced. Student capacities resource located at: http://nstahosted.org/pdfs/ngss/PracticesVennDiagram.pdf
(e.g., "engage in argument from evidence", etc.)

13. Describe a formative assessment and/or strategy that can be used with students to ensure their understanding of this standard (e.g., pre/post-tests, exit slips, student-generated test questions, one minute summary, etc.)
14. Describe how this item may be developed to include or how it already includes an authentic learning experience for students (e.g., cultural significance, place-based, etc.)
15. How could this item or topic be modified to meet the needs of multiple learning styles and/or abilities? (e.g., heterogeneous grouping, think-pair-share, KWL charts, etc.)

Thank you for your interest in this summer workshop!

Application screening begins April 10th & selections will be made by April 21st.
We will inform all applicants of our participant decisions after April 21st.